Virtual National Laboratory for Heavy Ion Fusion

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DRAFT HIF News

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Mark Herrmann honored with Presidential Award

Mark Herrmann, a physicist at LLNL, was among the 60 winners of the Presidential Early Career Award for Scientists and Engineers (PECASE) announced by the White House on 6/28/02. The PECASE is awarded each year by the National Science and Technology Council to recognize "outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership." The award was made for recent inertial fusion energy work, together with Mark's earlier work at PPPL on alpha channeling in magnetic fusion, that garnered the APS Division of Plasma Physics Award for Best Thesis. Mark is familiar to readers of HIF News for a generalized scaling law for the ignition of inertial confinement fusion capsules, and for showing good performance from plastic ablator capsules. These capsules would be much easier to fabricate and fill with deuterium-tritium than are the standard beryllium capsules and would ignite even if surfaces were 10x rougher than the NIF specification. *– John Lindl.*

14th International Symposium on Heavy Ion Fusion

This Symposium, which is held about every two years, was hosted in Moscow, Russia by the Institute of Theoretical and Experimental Physics (ITEP) May 27-31,2002. The location was excellent; the Rossia Hotel is very close to the Kremlin with many cultural attractions nearby. About half of the 200 participants were from Russia, which now has a very energetic and well organized HIF program covering all major topics. Sizable groups from the USA and Germany also participated, along with smaller numbers from Japan, France, and Spain. The final program included 60 talks in plenary sessions and 89 posters in two separate sessions. Topics included Heavy-Ion Targets, High-Power Accelerators, Atomic Physics (especially non-linear stopping power), Fusion Chamber Transport, Target Fabrication, and Chamber Design/Plant Issues. A special Overview Session featured National and International Programs, Theory, High Energy Density in Matter, and Future directions for Fusion. The entire set of manuscripts will be issued as a GSI report/disc, and selected papers will appear in one or more issues of the journal "Lasers and Particle Beams". The next HIF Symposium will be held in the USA in 2004.

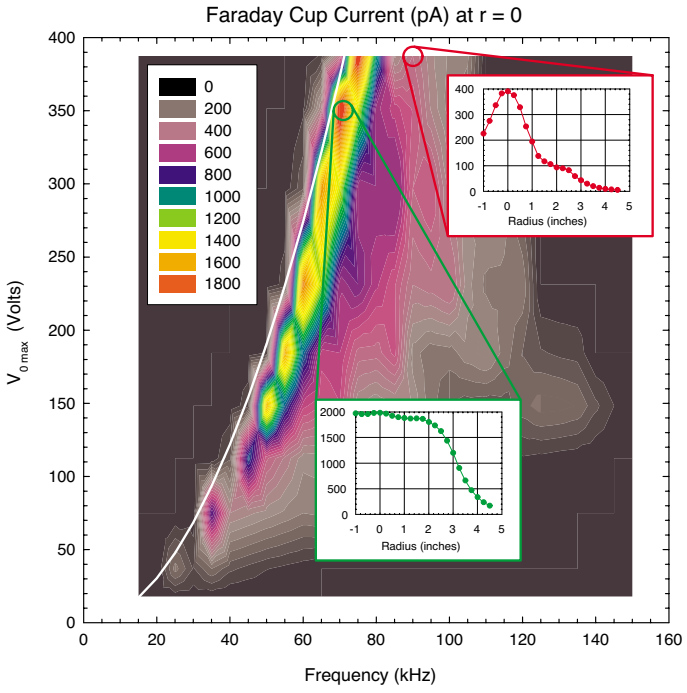
The main highlight of the Symposium was the operation of several new facilities in Russia, Germany, and the USA. In Russia, the Terra watt Accumulator Ring (TWAC) is now able to store high energy carbon ions, and with improved vacuum will be able to supply beam for a variety of relevant high energy density experiments. In Germany, GSI has made improvements to its existing synchrotron (SIS18) and is moving towards construction of the much larger system, SIS100. These machines are of value for beam manipulation and pipe wall electron production studies as well as basic beam/matter experiments. Generally, the high-energy ions from the rings are suitable for long thin cylindrical targets, and this was a major topic of the meeting. In the USA, HCX has begun basic beam dynamics studies at LBNL with K+ ions at 1.0 MEV and very high dimensionless perveance. The NTX neutralized final focus experiment in nearing readiness, and the STS-500 ion source test facility at LLNL is now operational. *– Edward Lee*

Paul Trap Simulator Experiment (PTSX)

Operation of the Paul Trap Simulator Experiment (PTSX) at PPPL has begun in order to study the propagation of intense beams in a compact laboratory setting. The transverse equations of motion for ions in a long cylindrical Paul trap are the same as those for the transverse motion of ions in an alternating-gradient periodic focusing system.

Initial experiments employ a cesium ion source that consists of an aluminosilicate cesium emitter together with simple acceleration and deceleration grids. The source, capable of producing up to 30 mA, is more than adequate to provide the estimated 300 nA required to fill the trap. To enable the future implementation of a Laser-Induced-Fluorescence diagnostic, a barium ion source will be developed.

Before attempting to trap an ion plasma, PTSX is operating in a steady-state mode in which cesium ions stream from the source directly to a Faraday cup 2.6 m away. The goal is to characterize the wall-voltage, wall-frequency, plasma-density operating parameter space, as shown. The primary feature of the initial data is the expected threshold for the instability of single particle orbits. Beyond this threshold, all particles are lost to the wall before they can reach the Faraday cup. Near this threshold, the beam profile is broad, and away from this threshold, the beam profile is peaked. *– Erik P. Gilson*



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